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A COLLECTION OF PROBLEMS IN
CREDIT RISK MODELING

KONRAD BANACHEWICZ

VRIJE UNIVERSITEIT

A COLLECTION OF PROBLEMS
IN CREDIT RISK MODELING

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. L. Bouter,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de faculteit der Exacte Wetenschappen
op dinsdag 16 juni 2009 om 10.45 uur
in de aula van de universiteit,
De Boelelaan 1105

door

KONRAD PIOTR BANACHEWICZ

geboren te Lublin, Polen

promotoren: prof.dr. A.W. van der Vaart
prof.dr. A.Lucas
copromotor: dr. F.A. Boshuizen

Dedicated to my Mum - MJTJ

THOMAS STIELTJES INSTITUTE
FOR MATHEMATICS



Netherlands Organisation for Scientific Research

Chapter 2 has been published in the *Econometrics Journal*.

Chapter 3 has been published in the *Journal of Forecasting*.

Chapter 4 has been published in the *Statistics and Probability Letters*.

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I would never have made it up to this point without (more than) a little help from my friends, colleagues, coworkers and other people the Good Lord decided to put in my way. During my research, as well as writing of this thesis, their support was of paramount importance. Right now is the proper time to express my gratitude. I thought long and hard how to order them – and decided that (approximate) chronology was my best shot.

I met Frans Boshuizen during my one year stay in Amsterdam for the master project. His academic credentials, combined with practical experience in the industry, proved to be an infectious mix: he supervised my master project and made sure the research project (finalized with this thesis) took off. For that, I am very thankful.

Aad van der Vaart has been a towering figure over this whole project – and for a good reason. His position in the field is obvious to anyone with even slight idea about modern statistics. During our many brainstorming sessions, he made sure all the necessary rigor was observed and I could always count on him whenever I landed in a dead end street. The analytic backbone he gave to this thesis, as well guidance during the writing process, put me in his debt.

For some strange combination of reasons, Andre Lucas was not directly involved from the very start – until the day I have had one of my better ideas in the past few years: drop by and ask him about it. That started a long series of conversations on topics ranging from maximum likelihood estimation, through creative formatting of the papers we wrote, up to philosophical questions plaguing us all. Our creative struggle, resulting from different personalities and working styles, gave birth to some parts of this thesis I am most proud of. I am enormously grateful for his support (while hoping he is not tired from hearing it again).

I had a very interesting time with Harry van Zanten and Geurt Jongbloed, with whom I had a pleasure to cooperate as a research assistant for the courses they were teaching. Different topics, target audiences, style – those factors certainly contributed to my development and helped me broaden my horizons as a scientist.

Siem Jan Koopman is one of those people whose existence you doubt until you have met them, since they seem too good to be true. He is *the* expert in the field, gentle and polite discussion partner and has a great gift for explaining topics far from trivial. I count myself as a lucky man, because I have had a chance to work with him.

Peter Spreij and Ton Vorst are, in my view, the type of people who wish the day was longer than mere twenty four hours – perhaps then their schedules could be a little less tight. Therefore I am in their debt for finding the time to sit on the reading committee; their comments and suggestions allowed to make some last-minute improvements to this dissertation.

Core aspect of the project aside, the people who helped me along the way were not just from the local academic environment.

This part of the list can start with nobody else than my Mum. She has been with me through thick and thin, never losing her faith in me and my ability to pull it through. Holding a degree herself, she understands full well how moments of enthusiasm and frustration are intertwined in this line of work. Brief as this part may seem, the dedication on the front page says it all.

Misza, *dearest of all my friends*, is clearly a person deserving a separate paragraph. He came to Amsterdam first, thus providing an armed reconnaissance type of knowledge. His help during the initial period was invaluable, while our multiple conversations in all sorts of places (sometimes at deeply unsocial hours) helped me see the light at the end of the tunnel. It was not a freight train, after all.

Ola has been there for me during the crucial parts of the project. She exhibited saintly patience with my ridiculous working hours, or the tendency to describe in a vigorous way the fact, that I have eventually forced an estimation method to converge. She would share my enthusiasm with successes, help me get through low points – and, most importantly, understand my drive towards research, although there were periods during the project which put enormous strain on both of us. I am forever in her debt and the chances of repaying it are slim, but I am going to try anyway.

Being an avid movie watcher, I was happy to find a kindred spirit in Wojtek. During our many visits to the cinema, as well as numerous social occasions, I have had a chance to experience his positive attitude

and undying optimism. If there is ever an encyclopedia of character types and the person describing “positive” is in trouble, look no further – just post the picture of Wojtek. That will do the trick.

Pawel proved to be a fixed point in the chaotic environment: his analytical mind and calm attitude guaranteed, that any advice was delivered in a succinct form – whether the topic was stochastic integration, typesetting or bureaucratic issues. Not to mention his vast musical knowledge, thanks to which I found some wonderful music I didn’t even know existed.

During the last lap of this race that this thesis was, I developed some doubts regarding the practical value of my research outside the academia. Ewa helped me believe in my own work again and look for the best options. Her lively mind, in a state of perpetual spin, was a crucial assistance at this point. For that, I am deeply grateful.

The people I met on different social occasions would probably require a separate page to list, but their joint contribution to the great time I have had outside work can not be measured. One person deserving special thanks is Radek - his infectious energy and down to earth attitude has always been an excellent remedy for feeling blue, regardless of the underlying reason.

Little did I know upon my arrival here – on a rainy October morning in 2003 – what lay ahead of me. Good times, bad times, it has been interesting five years. But the trip is over and I sometimes find myself thinking: would I do it again?

Oh yes. Big time.

Konrad Banachewicz
Amsterdam, January 2009

